

# DIN EN ISO 22475-1:2007-01 (E)

## Geotechnical investigation and testing - Sampling methods and groundwater measurements - Part 1: Technical principles for execution (ISO 22475-1:2006)

---

<b>Contents</b>		<b>Page</b>
Foreword .....		6
Introduction .....		7
<b>1</b>	<b>Scope .....</b>	<b>8</b>
<b>2</b>	<b>Normative references .....</b>	<b>8</b>
<b>3</b>	<b>Terms and definitions .....</b>	<b>9</b>
3.1	Site investigation methods .....	9
3.2	Drilling rigs and equipment .....	10
3.3	Sampling .....	10
3.4	Groundwater measurements .....	15
<b>4</b>	<b>Drilling rigs and ancillary equipment .....</b>	<b>17</b>
4.1	General .....	17
4.2	Requirements for the drilling rigs and equipment .....	17
4.3	Equipment scope .....	17
<b>5</b>	<b>General requirements prior to sampling and groundwater measurements .....</b>	<b>18</b>
5.1	General .....	18
5.2	Selection of techniques and methods .....	18
5.3	Requirements for ground investigation sites and points .....	18
5.4	Preliminary information needed before starting sampling and groundwater measurements .....	19
5.5	Backfilling and site abandonment .....	20
5.6	Safety and special requirements .....	20
<b>6</b>	<b>Soil sampling methods .....</b>	<b>20</b>
6.1	General .....	20
6.2	Categories of soil sampling methods .....	20
6.3	Sampling by drilling (continuous sampling) .....	21
6.4	Sampling using samplers .....	27
6.5	Block sampling .....	34
<b>7</b>	<b>Rock sampling methods .....</b>	<b>36</b>
7.1	General .....	36
7.2	Categories for rock sampling methods .....	36
7.3	Sampling by drilling .....	39
7.4	Block sampling .....	40
7.5	Integral sampling .....	40
<b>8</b>	<b>Groundwater sampling methods for geotechnical purposes .....</b>	<b>40</b>
8.1	General .....	40
8.2	Equipment .....	41
8.3	Techniques of groundwater sampling .....	41
<b>9</b>	<b>Groundwater measuring stations and piezometers .....</b>	<b>42</b>
9.1	General .....	42
9.2	Piezometers .....	43
9.3	Installation of piezometers .....	47

9.4	Maintenance .....	50
9.5	Decommissioning .....	51
10	Groundwater measurements .....	51
10.1	Calibration .....	51
10.2	Performance of the measurements .....	51
11	Handling, transport and storage of samples .....	52
11.1	General .....	52
11.2	Preservation materials and sample containers .....	53
11.3	Handling of samples .....	53
11.4	Labelling of samples .....	54
11.5	Transport of samples .....	54
11.6	Preparation of storage and shipping containers .....	56
11.7	Storage of samples .....	57
12	Report .....	57
12.1	Field report .....	57
12.2	Report of the results .....	63
Annex A (informative) Example of a form for the preliminary information on the intended sampling and groundwater measurements .....		65
Annex B (informative) Field reports .....		67
Annex C (informative) Drilling and sampling equipment for soil and rock .....		76
Annex D (informative) Vacuum bottles for groundwater sampling .....		122
Annex E (informative) Protective measures of piezometers .....		124
Bibliography .....		126
Figures Figure 1 -- Definitions of the diameters D1, D2, D3 and D4 .....		12
Figure 2 -- Application of fracture state terms for rock cores .....		13
Figure 3 -- Lengths of core run and sample .....		14
Figure 4 -- Examples of open-tube samplers (OS) for recovering samples from boreholes .....		31
Figure 5 -- Schematic thin-walled stationary piston sampler (PS) for sampling from borehole bottom .....		33
Figure 6 -- Examples of open systems .....		43
Figure 7 -- Examples of closed systems .....		45
Figure 8 -- Closed system with filter pack and sealing in a borehole .....		49
Figure 9 -- Examples of sealing and securing samples .....		55
Figure 10 -- Example of the configuration of an open groundwater measuring system .....		62
Figure C.1 -- Drill rods and casing .....		76
Figure C.2 -- Drill rods taper threaded "Y" series .....		79
Figure C.3 -- Drill rods taper threaded "J" series .....		79
Figure C.4 -- Corebarrels "metric" series, according to ISO 3552-1 .....		84

Figure C.5 -- Corebarrels "W" series, according to ISO 3551-1 .....	86
Figure C.6 -- Corebarrels "W" series, according to ISO 3551-1 .....	87
Figure C.7 --Wireline corebarrel assembly .....	88
Figure C.8 -- Geotechnical wireline corebarrel (inner and outer tube assembly) .....	90
Figure C.9 -- Water-well casing with flush butt joints, according to BS 879 .....	92
Figure C.10 -- Water-well casing with screwed and socketed joints, according to BS 879 .....	92
Figure C.11 -- Three-cone milled tooth rock bit .....	95
Figure C.12 -- Tungsten carbide button bit .....	95
Figure C.13 -- Typical corebarrel lifters .....	97
Figure C.14 -- Typical sampler retainers .....	98
Figure C.15 -- Thin wall sampler (Shelby tube) .....	99
Figure C.16 -- Hydraulic piston sampler .....	100
Figure C.17 -- Stationary piston sampler with a 50-mm diameter liner -- Sampling category A .....	101
Figure C.18 -- Stationary piston sampler with a 50-mm liner -- Parts .....	103
Figure C.19 -- Stationary piston sampler with a 50-mm diameter liner -- Sampling categories A and B .....	104
Figure C.20 -- U100 Sampler .....	105
Figure C.21 -- Standard penetration test (SPT) samplers .....	106
Figure C.22 -- Typical automatic trip hammer .....	107
Figure C.23 -- Window and windowless samplers .....	108
Figure C.24 -- Clay cutter and shell (bailer) .....	109
Figure C.25 -- Sectional shell .....	110
Figure C.26 -- Chisels and stubber .....	111
Figure C.27 -- Continuous flight auger .....	112
Figure C.28 -- Augers with diameters between 36 mm and 100 mm -- Sampling category C .....	113
Figure C.29 -- Hollow stem auger .....	114
Figure C.30 -- Examples of sampling from trial pits .....	115
Figure C.31 -- Recovering samples from trial pits -- Example .....	116
Figure C.32 -- Example for a thin-walled open-tube sampler .....	117
Figure C.33 -- Example for a thick-walled open-tube sampler .....	118
Figure C.34 -- Example of sampling from borehole bottom using a large sampler (Sherbrooke block sampler) .....	119

Figure C.35 -- Method of sampling using a Laval sampler .....	121
Figure D.1 -- Equipment for vacuum bottle sampling .....	123
Figure E.1 -- Example of termination of an open piezometer above ground level .....	124
Figure E.2 -- Example of termination of an open piezometer below ground level .....	125
Tables Table 1 -- Quality classes of soil samples for laboratory testing and sampling categories to be used .....	21
Table 2 -- Sampling by drilling in soils .....	23
Table 3 -- Soil sampling using samplers .....	28
Table 4 -- Examples on sampling methods with respect to the sampling category in different soils .	35
Table 5 -- Soil sampling using samplers .....	38
Table C.1 -- Drill rods and casing "W"-series according to ISO 3551-1 .....	77
Table C.2 -- Drill rods and casing "metric" series according to ISO 3552-1 .....	78
Table C.3 -- Drill rods taper threaded "Y" series .....	79
Table C.4 -- Drill rods taper threaded "J" series .....	79
Table C.5 -- Corebarrels "W" series, according to ISO 3551-1 .....	80
Table C.6 -- Corebarrels "metric" series, according to ISO 3552-1 .....	81
Table C.7 -- Air flush corebarrels .....	82
Table C.8 -- Drill rods and casing .....	83
Table C.9 -- Corebarrels "metric" series, according to ISO 3552-1 .....	85
Table C.10 --Wireline drill rod dimensions .....	89
Table C.11 -- Wireline corebarrel dimensions .....	89
Table C.12 -- Geotechnical wireline corebarrel drill pipe dimensions .....	91
Table C.13 -- Geotechnical wireline corebarrel dimensions .....	91
Table C.14 -- Dimensions of water-well casings with flush butt joints .....	92
Table C.15 -- Dimensions of water-well casings with screwed and socketed joints .....	92
Table C.16 -- Bit selection chart .....	93
Table C.17 -- Core bit profiles -- Diamond set, impregnated, TC and PCD .....	94
Table C.18 -- Three-cone milled tooth rock bit .....	95
Table C.19 -- Tungsten carbide button bit .....	96